INSTRUCTION MANUAL

REGULATED POWER SUPPLIES

MODEL

LXD-CC-152

LAMB

C5-S4-021

LAMBDA ELECTRONICS CORP.–MELVILLE, L. I., N. Y.

INSTRUCTION MANUAL

FOR

REGULATED POWER SUPPLIES

MODEL

LXD-CC-152

This manual provides instructions intended for the operation of Lambda power supplies, and is not to be reproduced without the written consent of Lambda Electronics Corp. All information contained herein applies to all LXD-CC models unless otherwise specified.

LAMBDA ELECTRONICS CORP. MELVILLE, L.I., N.Y.

MAIN PLANT TELEPHONE: 516 MYrtle 4-4200

IM-LXD-CC

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SPECIFICATIONS AND FEATURES

D.C. OUTPUT - Voltage regulated for line and load. Negative output always tracks positive output. See table 1 for voltage and current ratings.

TABLE I

VOLTAGE AND CURRENT RANGES

VOLTAGE RANGE (VDC)	*MAXIMUM CURRENT (AMPS) AT AMBIENT TEMPERATURE			
	40°C	50°C	60°C	71°C
±15	4.0	3.7	3.2	2.4
±12	3.0	2.7	2.3	1.8

*For current ratings at different output voltages refer to page 3.

Current range must be chosen to suit the appropriate maximum ambient temperature.

REGULATED VOLTAGE OUTPUT (each output)

Regulation (line).....0.1% with input variations from 105-132 or 132-105 volts AC.

Regulation (load).....0.1% for load variations from no load to full load or full load to no load.

Ripple and Noise.....1.5 millivolts rms; 5 millivolts peak to peak.

Temperature Coefficient.....Output change in voltage 0.03%/°C

Remote Sensing.....Provision is made for remote sensing to eliminate effect of power output lead resistance on DC regulation. No remote sensing is available for the common terminal.

OVERSHOOT - No overshoot under conditions of power turn-on, turn-off, or power failure.

AC INPUT - 105-132 VAC at 47-440 Hz. Ratings apply at 57-63 Hz. For operation at 47-53 Hz, delete the 40°C current rating. For operation at 63-440Hz, consult factory.

TRACKING - Absolute voltage difference between negative and positive outputs within 2%; 0.2% change for all conditions of line, load and temperature.

OVERLOAD PROTECTION

Thermal.....Thermal circuit resets automatically when over temperature condition is eliminated.

Electrical.....Automatic electronic current limiting circuit limits output current to a safe value Automatic current limiting protects the load and power supply when external overloads and direct shorts occur.

INPUT AND OUTPUT CONNECTIONS - Terminal block on rear of chassis.

OPERATING AMBIENT TEMPERATURE RANGE AND DUTY CYCLE - Continuous duty from 0°C to 71°C ambient.

STORAGE TEMPERATURE (non-operating) - -55°C to 85°C

OUTPUT ADJUST CONTROL - Voltage adjust control permits adjustment of D.C. output. Single control simultaneously adjusts the dual (±15 to ±12V) outputs.

PHYSICAL DATA

Size.....4-15/16" x 4-15/16" x 9-3/8"

Weight.....15 lbs. net; 17 lbs. shipping wt.

Finish.....Gray, FED. STD. 595 No. 26081

MOUNTING - Three surfaces, each with tapped mounting holes can be utilized for mounting this unit. The LXD-CC power supply can be mounted with Top, Front, or Left Side facing up. Top, Front, or Left Side must be in a horizontal plane. Refer to figure 7 for mounting details.

SUFFIX "R" - LXD-CC-152 power supplies with suffix "R" are fungus inert.

"V" OPTION - The LXD-CC-152 power supply can be obtained for 205-265 VAC, 47-440 Hz input or 187-242 VAC, 47-440 Hz input. See nameplate for AC input rating. See schematic diagram for rewiring of AC input. Ratings apply for 57-63 Hz. For operation at 47-53 Hz, delete the 40°C current rating. For operation at 63-440 Hz, consult factory.

ACCESSORIES

Rack Adapters.....Rack Adapters LRA-6, LRA-10,LRA-11, and LRA-13 used for ruggedized mounting with or without chassis slides are available.

Overvoltage Protector..Externally mounted, Overvoltage Protector LM-OV-3 is available.

DETERMINATION OF CURRENT RATINGS AT OUTPUT VOLTAGE BETWEEN ±12&±15 VOLTS - Current ratings vary linearly with output voltages. To determine current for any given output voltage (between rated limits) proceed as follows:

1. Determine operating ambient termperature.
2. Find constants (see formula) m and c in chart below.
3. Applying current formula:

$$Io = mVo + c$$

where Io = output current, m = constant (see chart), c = constant (see chart) and Vo = desired output voltage; determine output current.

Constant m,c at Ambient Temperature

40°C		50°C		60°C		71°C	
m	c	m	c	m	c	m	c
0.33	-1.00	0.33	-1.30	0.30	-1.30	0.20	-1.40

THEORY OF OPERATION

The theory applies to the plus (+) side of the dual output, but is equally applicable to the minus (-) side.

The Lambda power supply consists of an AC input circuit and transformer; and a main regulator circuit consisting of the main rectifier, filter, series regulator transistor, and Hybrid Voltage Regulator. The Hybrid Voltage Regulator (HC1) utilizes thick film reresistors, capacitors, monolithic integrated circuits and power driver transistors in chip form to achieve maximum reliability. The circuit arrangement is shown in block diagram form, figure 5.

Single phase input power is applied to transformer T1 through terminals 1 and 2.

The main rectifier, a full wave rectifier, provides the power which is filtered by capacitor C1 and then regulated via series regulator Q8.

Voltage tracking of the slave section to the master section is accomplished as follows:

When the master output voltage increases, voltage across R12 and R15 also increases, causing an increase in one input to a comparator located in (HC2). The comparator compares this change with the output voltage of the slave unit resulting in an error signal at the output of the comparator. The error signal from the comparator causes the series regulator impedance to decrease, this action increases the slave output voltage.

OPERATING INSTRUCTIONS

BASIC MODE OF OPERATION

This power supply operates as a constant voltage source provide the load current does not exceed the rated value at 40°C. For continuous operation, load current must not exceed the rating for each ambient temperature. When load exceeds the 40°C rating, both voltag and current decrease until voltage reaches zero and the current at short circuit is reduced to a value which is less than the rated current.

CONNECTIONS FOR OPERATION

NOTE: Make all connections to the unit before applying AC input power.

Ground Connections. The Lambda power supply can be operated either with negative, positive, or common terminal grounded. Use insulated wire whenever any output terminal is connected to terminal 3.

Connection Terminals. Make all connections to the supply at the terminal block on rear of the supply. Apply input power to terminals 1 and 2; always connect the ungrounded (hot) lead to terminal 1. The supply positive terminal is brought out to terminal 7. The suppl negative terminal is brought out to terminal 5. Recommended wiring of the power supply to the load and selection of wiring is shown in figures 1-4.

Selection of proper wiring is made on the basis of load requirements. Make all performance checks and measurements of current and voltage at the rear output terminals. Connect measuring devices directly to terminals or use the shortest leads possible.

SUPPLY LOAD CONNECTIONS

Connections For Operation as a Constant Voltage Source. The output impedance and regulation of the power supply at the load may change when using the supply as a constant voltage source and connecting leads of practical length are used. To minimize the effect of the output leads on these characteristics, remote sensing is used. Recommended types of supply-load connections with local or remote sensing are described in the following paragraphs.

Refer to figure 1 to determine voltage drop for particular cable length, wire size and current conditions. Lead lengths must be measured from supply terminals to load terminals as shown in figure 2.

Local Sensing Connection, Figure 3. Local sensing is the connection suitable for applications with relatively constant load. Any load connection combination, as shown in the figure, can be used.

Remote Sensing Connection, Figure 4. Remote sensing provides complete compensation for the DC voltage drops in the connecting cables. Sensing leads should be a twisted pair to minimize AC pick-up.

OPERATION AFTER PROTECTIVE DEVICE SHUTDOWN

Thermal Shutdown

The thermostat opens the input circuit only when the temperature of the transistor heat radiator exceeds a maximum safe value. The thermostat will automatically reset when the temperature of the heat sink decreases to a safe operating value. After eliminating the cause(s) for overheating and allowing time for the power supply to cool to a proper temperature, resume operation of the supply.

Overvoltage Shutdown

When the power supply output voltage increases above the overvoltage limit, SCR1 (within external overvoltage protector, if used) will short circuit output of the supply. After eliminating the cause(s) for overvoltage, resume operation of the supply by momentarily interrupting the AC input circuit. (refer to TROUBLE SHOOTING CHART)

MAINTAINANCE

GENERAL

This section describes trouble analysis routine and replacement procedures that are useful for servicing the Lambda LXD-CC power supplies. A trouble chart is provided as an aid for the troubleshooter. Refer to the section on SPECIFICATIONS AND FEATURES for the minimum performance standards.

TROUBLE ANALYSIS

Whenever trouble occurs, systematically check primary power lines, external circuit elements, and external wiring for malfunction before trouble shooting equipment. Failures and malfunctions often can be traced to simple causes such as improper jumper and supply-load connections.

Use the electrical schematic diagram and block diagram, figure 5, as an aid to locating trouble causes. The schematic diagram contains various circuit voltages that are averages for normal operation. Measure these voltages using the conditions for measurement specified on the schematic diagram. Use measuring probes carefully to avoid causing short circuits and damaging circuit components.

CHECKING TRANSISTORS AND CAPACITORS

Check transistors with an instrument that has a highly limited current capability. Observe proper polarity to avoid error in measurement. The forward transistor resistance is low but never zero; backward resistance is always higher than the forward resistance.

For good transistors, the forward resistance for any junction is always greater than zero.

Do not assume trouble is eliminated when only one part is replac This is especially true when one transistor fails, causing other transistors to fail. Replacing only one transistor and turning power on before checking for additional defective components could damage the replaced component.

When soldering semi-conductor devices, wherever possible, hold the lead being soldered with a pair of pliers placed between the component and the solder joint to provide an effective heat sink.

NOTE: The leakage resistance obtained from a simple resistance check of a capacitor is not always an indication of a faulty capacitor. In all cases the capacitors are shunte with resistances, some of which have low values. Only a dead short is a true indication of a shorted capacitor.

TROUBLE CHART

The trouble chart is intended as a guide for locating trouble causes, and is used along with the schematic diagram.

The operating conditions assumed for the trouble chart are as follows:

a) AC power of proper voltage and frequency is present at input terminals.

b) Common terminal is connected to chassis ground.

c) The power supply is connected for constant voltage with local sensing. See schematic; dotted lines indicate jumpers connected for local sensing operation.

TROUBLE SHOOTING CHART

	Symptom	Probable Cause	Remedy
1.	Zero volts DC output, both sides.	Open T1 primary.	Check T1 primary for open, replace as necessary.

TROUBLE SHOOTING CHART

Symptom	Probable Cause	Remedy
	Open thermostat, S1.	Refer to table I of SPECIFICATIONS AND FEATURES for current ratings at given ambient temperature. After allowing time for the power supply to cool, resume operation of power supply.
	Short circuit across output of supply.	Check load and load connections, correct as necessary.
	Shorted C1, CR3, C4.	Check and replace as necessary.
	Series regulator section open.	Check HC1 pin 8 for correct voltage reading (as indicated on schematic diagram), replace as necessary.
	Current sensing resistor open.	Check R25 for open, replace as necessary.
2. Zero volts DC output, minus side.	Shorted C16 CR12, C18, C9, R15.	Check and replace as necessary.
	Series regulator section open.	Check HC2 pin 8 for correct voltage reading (as indicated on schematic diagram), replace as necessary.
	Current sensing resistor open.	Check R28 for open, replace as necessary.
3. Unable to adjust output voltage.	Damaged VDC adjust control.	Check R1 for short or open, replace as necessary.
	R2 and/or R4 set too low.	Refer to ADJUSTMENT OF CALIBRATION CONTROLS.

	Symptom	Probable Cause	Remedy
4.	High ripple at line frequency or twice line frequency and unregulated DC output, both sides.	Series regulator section shorted.	Check Q8 for short, replace as necessary.
		Open plus sense lead.	Check sensing connections.
5.	Same as 4, minus side.	Series regulator section shorted.	Check Q9 for short; replace as necessary.
		Open minus sense jumper.	Check connection, correct as necessary.
6.	Same as 4, except intermittent.	Foreign matter fallen into unit.	Check for loose bench hardware and wire clippings that may have fallen through cover.
7.	High ripple at twice line frequency, both sides.	Open C1.	Check and replace as necessary.
8.	Same as 7 , minus side.	Open C19.	Check and replace as necessary.
9.	High ripple at line frequency, both sides.	Open CR1 or CR2.	Check for open, replace as required.
10.	Same as 9 , minus side.	Open CR10 or CR11.	Check for open, replace as required.
11.	High ripple at other than line frequency.	Defective C4, C18.	Check C4, C18; replace as necessary.
12.	Large spikes at output.	Defective rectifiers CR1, CR2, CR10, CR11.	Replace as required.
13.	Output voltage too high, both sides.	R1 set too high; open sensing lead.	Check setting of R1; check output connections.

Symptom	Probable Cause	Remedy
Very low output voltage on both sides when using external over-voltage protector.	Overvoltage protector fired due to OV condition.	Momentarily interrupt AC input. If supply operates normally, a transient has occurred. in line or load, check wiring (switches, etc.). If supply fails to reach full output voltage, remove AC input, disconnect red lead of overvoltage protector, remove load, apply AC power and refer to procedure for: Output Voltage Too High "Symptom 13."

RFORMANCE CHECKS

Check the ripple and regulation of the power supply using the st connection diagram shown in figure 6. Use suggested test equipment equivalent to obtain accurate results. Refer to SPECIFICATIONS AND ATURES for minimum performance standards.

Set the differential meter, DC VTVM (John Fluke Model 801H or uivalent) to the selected power supply operating voltage. Check the wer supply load regulation accuracy while switching from the load to -load condition. Long load leads should be a twisted pair to minimize pickup.

Use a Variac to vary the line voltage from 105-132 or 132-105 lts AC and check the power supply line regulation accuracy on the VTVM fferential meter.

Perform checks on both plus and minus sides.

JUSTMENT OF CALIBRATION CONTROLS R2 and R4

Whenever Q8, Q9, HC1, HC2, R25, R28, R2 or R4 are replaced, and ltage and current indications do not reflect maximum ratings, adjust and R4 as follows. The adjustment procedure requires that the power pply is removed from associated equipment, is at an ambient temperature 25-30°C, and is stabilized and not operating.

ADJUSTMENT OF CALIBRATION CONTROLS R2 and R4 (Con't)

1. Remove AC input power to the supply.
2. Break seal on wiper of R2 from resistor housing and turn to full CW position.
3. Operate power supply for constant voltage with local sensing, connected as shown in figure 3 with no external load.
4. Turn voltage adjust control until minimum rated output voltage is obtained.
5. Apply load so that output current is 115% of 40°C rating for the unit. (Apply load to plus (+) output only.)
6. Using an oscilloscope, Tektronix 503 or equivalent, observe output voltage, plus (+) side only, while adjusting R2 in CCW direction. Adjust R2 until output ripple increases sharply and oscilloscope pattern changes.
7. After adjustment is completed, remove AC power input to the supply and use glyptol sealant to seal wiper of R2 to resistor housing.
8. After sealing, check setting and repeat adjustment procedure if required.

The following steps apply to the minus (-) side.

9. Remove AC input power to the supply.
10. Break seal on wiper of R4 from resistor housing and turn to full CW position.
11. Operate power supply for constant voltage with local sensing, connected as shown in figure 3, with no external load.
12. Turn voltage adjust control until minimum rated output voltage is obtained.
13. Apply load so that output current is 115% of 40°C rating for the unit.
14. Using an oscilloscope, Tektronix 503 or equivalent, observe output voltage while adjusting R4 in CCW direction. Adjust R4 until output ripple increases sharply and oscilloscope pattern changes.
15. After adjustment is completed, remove AC power input to the supply and use glyptol sealant to seal wiper of R4 to resistor housing.
16. After sealing, check setting and repeat adjustment procedure if required

SERVICE

When additional instructions are required or repair service is desired, contact the nearest office of the Lambda Electronics Corp. where trained personnel and complete facilities are ready to assist you.

Please include the power supply model and serial number together with complete details of the problem. On receipt of this information Lambda will supply service data or advise shipping for factory repair service.

SERVICE (Con't)

All repairs not covered by the warranty will be billed at cost and an estimate forwarded for approval before work is started.

PARTS ORDERING

Standard components and special components used in the Lambda power supply can be obtained from the factory. In case of emergency, critical spare parts are available through any Lambda office.

The following information must be included when ordering parts:

1. Model number and serial number of power supply and purchase date.
2. Lambda part number,
3. Description of part together with circuit designation.
4. If part is not an electronic part, or is not listed, provide a description, function, and location of the part.

PARTS LIST

The electrical parts located on Lambda model LXD-CC-152 are listed here. In addition, there are separate listings of parts for the "V" option and LMOV-3 accessory.

MODEL LXD-CC-152

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
C1	Cap., elect., 5,100 mf -10+100%, 30 vdc	CBS-51-088	$ 7.00
C2, C3	Not assigned		
C4	Cap., elect., 400 mf -10+100%, 40 vdc	CBR-40-085	3.50
C5	Cap., mylar, 0.15 mf ±10%, 200 vdc	CGM-15-005	.50
C6, C7	Not assigned		
C8	Cap., mylar, 0.033 mf ±10%, 400 vdc	CGL-33-009	.50
C9	Cap., elect., 3.3 mf ±20%, 35 vdc	CBN-33-019	1.35
C10 thru C12	Not assigned		
C13	Cap., mylar, 0.01 mf ±10%, 200 vdc	CGL-10-002	.36
C14	Cap., mylar, 470 pf ±10%, 200 vdc	CGJ-47-002	.33
C15, C16	Cap., mylar, 0.1 mf ±10%, 200 vdc	CAM-10-012	.65
C17	Same as C13		
C18	Same as C4		
C19	Same as C1		
CR1, CR2	Rectifier	FBL-00-054	1.50
CR3	Rectifier	FBL-00-094	.99
CR4 thru CR9	Not assigned		
CR10, CR11	Same as CR1		
CR12	Same as CR3		
HC1	Hybrid regulator	FBH-24-019	50.00
HC2	Hybrid regulator	FBH-24-020	50.00
Q1 thru Q7	Not assigned		
Q8, Q9	Transistor, NPN	FBN-36485	4.13
R1	Res., var., ww, 9,000 ohms ±5%, 2 w	DNS-90-051	2.50
R2	Res., var., ww, 1,200 ohms ±10%, 2 w	DNS-12-087	1.03
R3	Not assigned		
R4	Same as R2		
R5	Res., comp., 15,000 ohms ±10%, ½ w	DEB-1531	.12
R6	Not assigned		
R7	Same as R5		
R8	Res., comp., 1,000 ohms ±10%, ½ w	DEB-1021	.12
R9 thru R11	Not assigned		

MODEL LXD-CC-152 (Cont.)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
R12	Res., film, 8,870 ohms ±0.5%, 1/8 w	DCS-89-090	$ .33
R13, R14	Not assigned		
R15	Res., film, 2,550 ohms ±0.5%, 1/8 w	DCS-25-089	.33
R16, R17	Not assigned		
R18	Res., comp., 2,200 ohms ±10%, ¼ w	DCB-2221	.06
R19	Res., comp., 150 ohms ±10%, ½ w	DEB-1511	.12
R20 thru R22	Not assigned		
R23	Same as R19		
R24	Not assigned		
R25 thru R28	Res., ww, 0.22 ohm ±5%, 5 w	DFM-22-045	1.00
S1	Thermostat	FKA-148-030	1.41
T1	Transformer	ABA-LXD-CC152	38.04

PARTS FOR SUFFIX "R"

On model LXD-CC-152 with suffix "R", resistor R1 changes. Part no. change for R1 is listed here.

R1	Res., var., ww, 9,000 ohms ±5%, 2 w	DNS-90-073	6.25

PARTS FOR "V" OPTION

On model LXD-CC-152 with suffix "V", capacitor C8 and transformer T1 change. Part no. changes for C8 and T1 are listed here.

C8	Cap., paper, 0.01 mf ±10%, 1000 vdc	CAL-10-021	1.77
T1	Transformer	ABA-XD-CC-152G	38.04

PARTS FOR OVERVOLTAGE PROTECTOR ACCESSORY MODEL LMOV-3

C1	Cap., mylar, 0.01 mf ±20%, 80 vdc	CGL-10-008	.50
Q1	Transistor, NPN	FBN-L102	2.40
Q2	Transistor, PNP	FBN-L114	3.50
R1	Res., var., ww, 20,000 ohms ±10%, 1 w	DNT-20-010	2.85

PARTS FOR OVERVOLTAGE PROTECTOR ACCESSORY MODEL LMOV-3 (Cont.)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
R2	Res., film, 4,700 ohms ±2%, ½ w	DCS-47-028	.30
R3	Res., film, 200 ohms ±5%, ½ w	DCR-20-010	.20
R4	Res., thermistor, 425 ohms ±5%, ¼ w	DKR-43-004	1.52
R5, R6	Res., comp., 1,200 ohms ±10%, ½ w	DEB-1221	.12
R7	Res., comp., 39 ohms ±5%, ¼ w	DCB-3905	$ .15
R8	Res., comp., 15,000 ohms ±10%, ½ w	DEB-1531	.12
R9	Res., comp., 22 ohms ±10%, ½ w	DEB-2201	.12
R10	Same as R5		
SCR1	Rectifier, silicon controlled	FBP-00-009	6.00

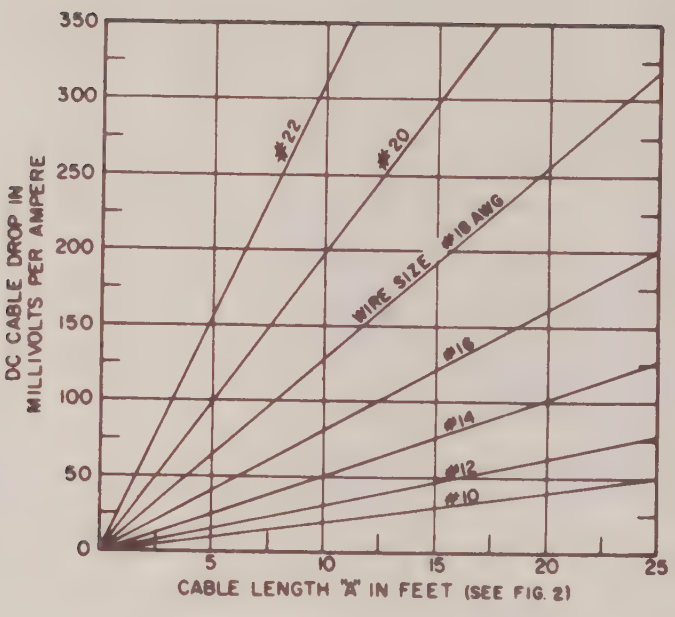


Figure 1. Cable Connection Chart

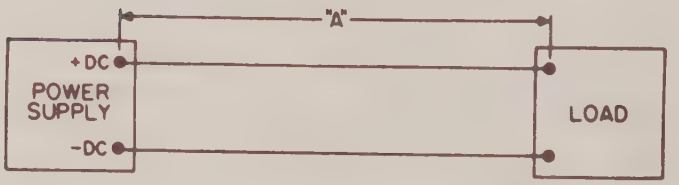


Figure 2. Cable Length "A" in Feet

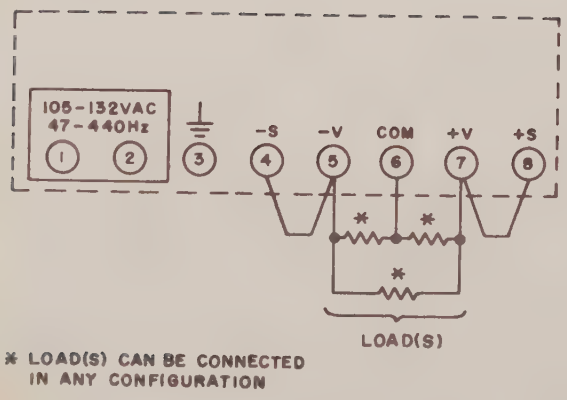


Figure 3. Local Sensing Connection

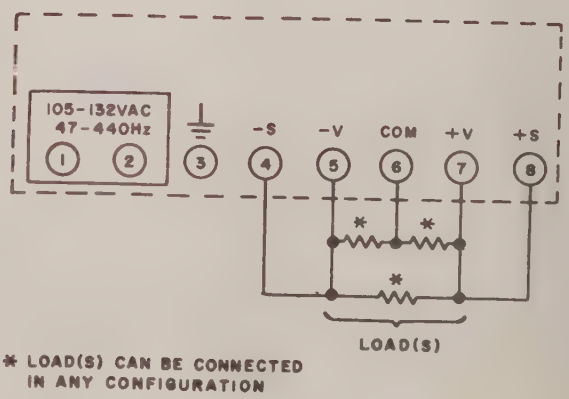


Figure 4. Remote Sensing Connection

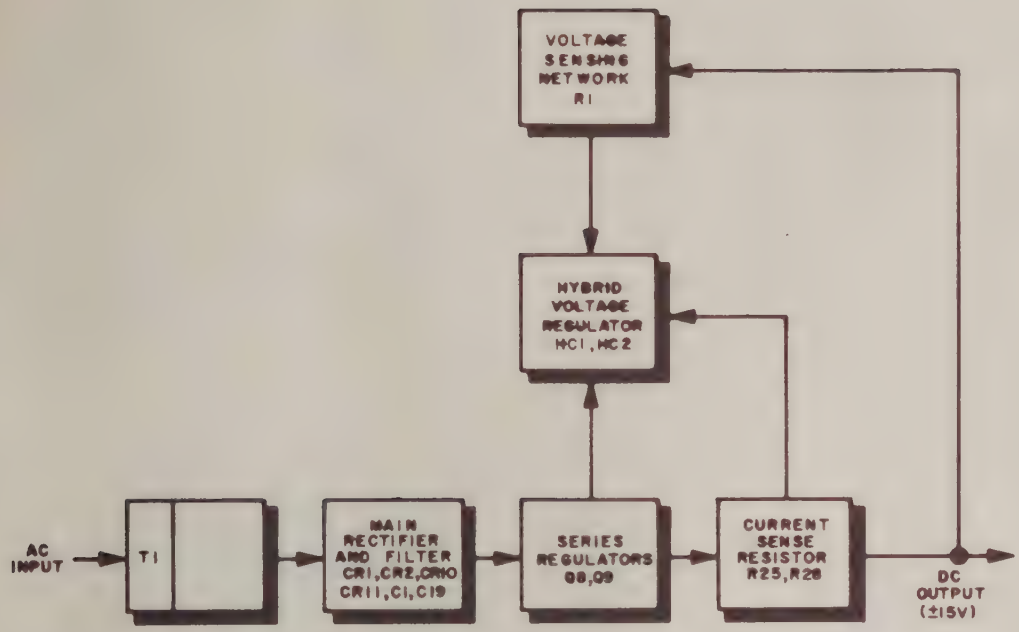

VOLTAGE SENSING NETWORK R1
HYBRID VOLTAGE REGULATOR HC1, HC2
AC INPUT
T1
MAIN RECTIFIER AND FILTER CR1, CR2, CR10 CR11, C1, C19
SERIES REGULATORS Q8, Q9
CURRENT SENSE RESISTOR R25, R28
DC OUTPUT (±15V)

Figure 5. Block Diagram

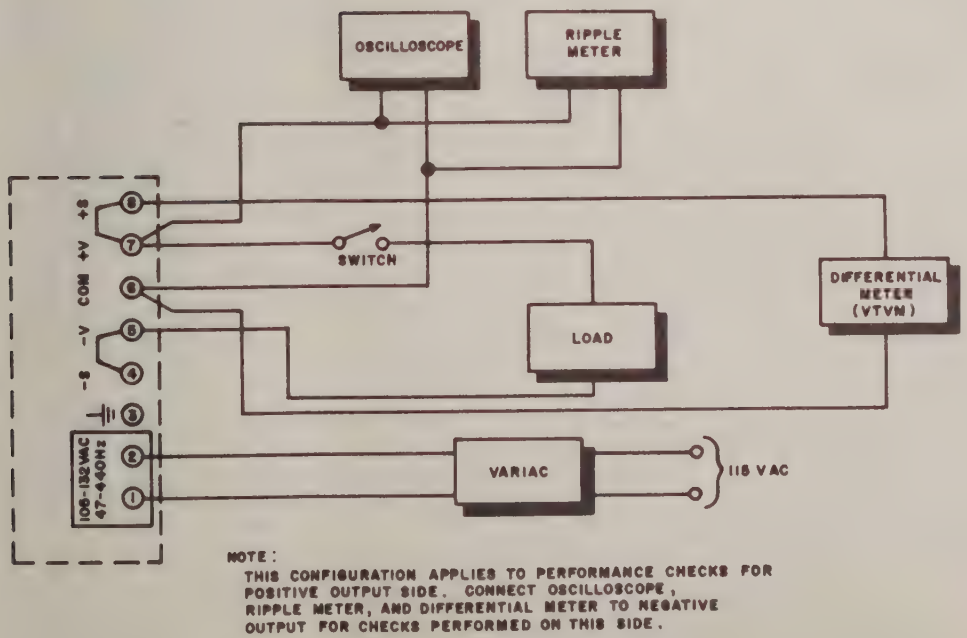
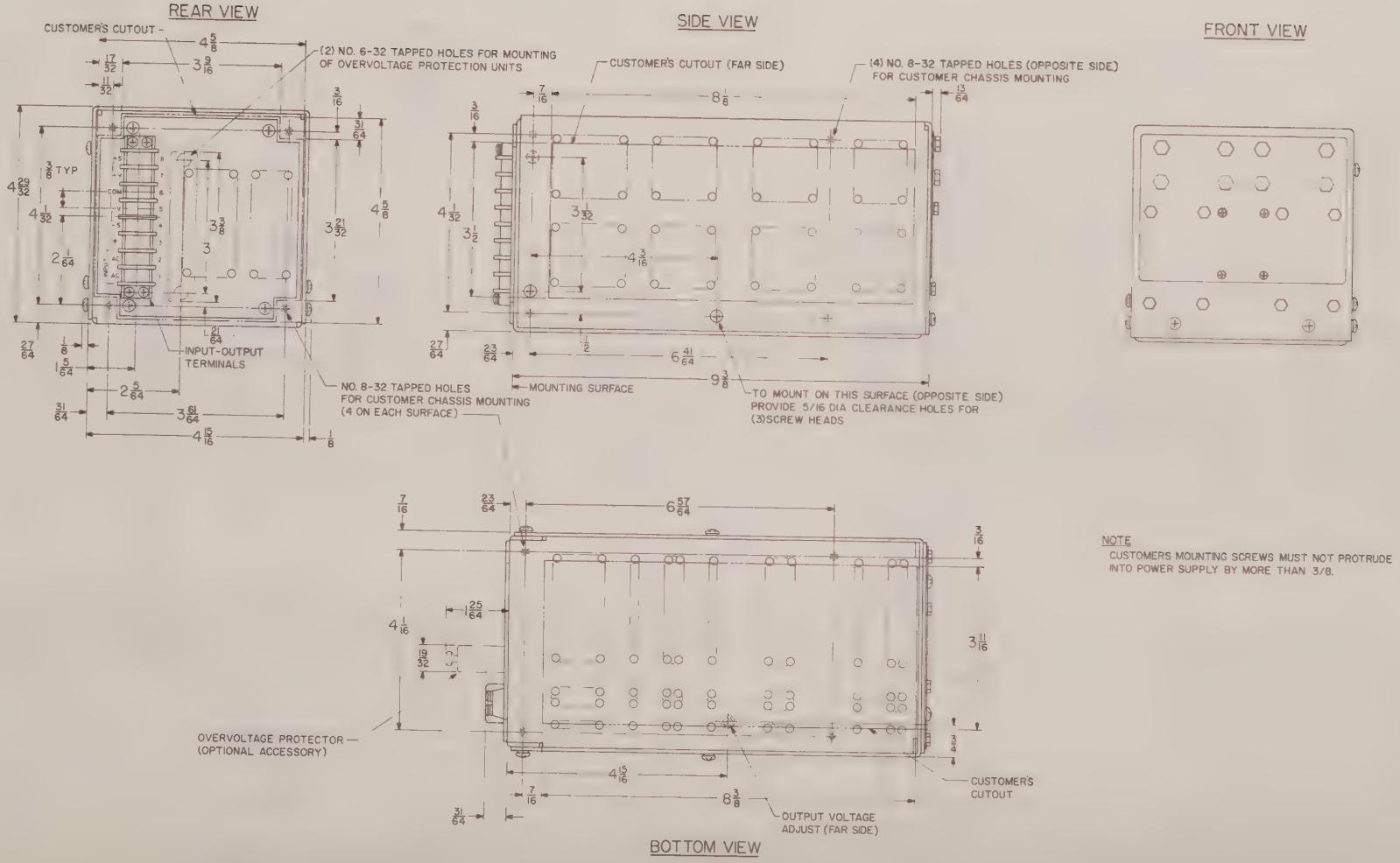
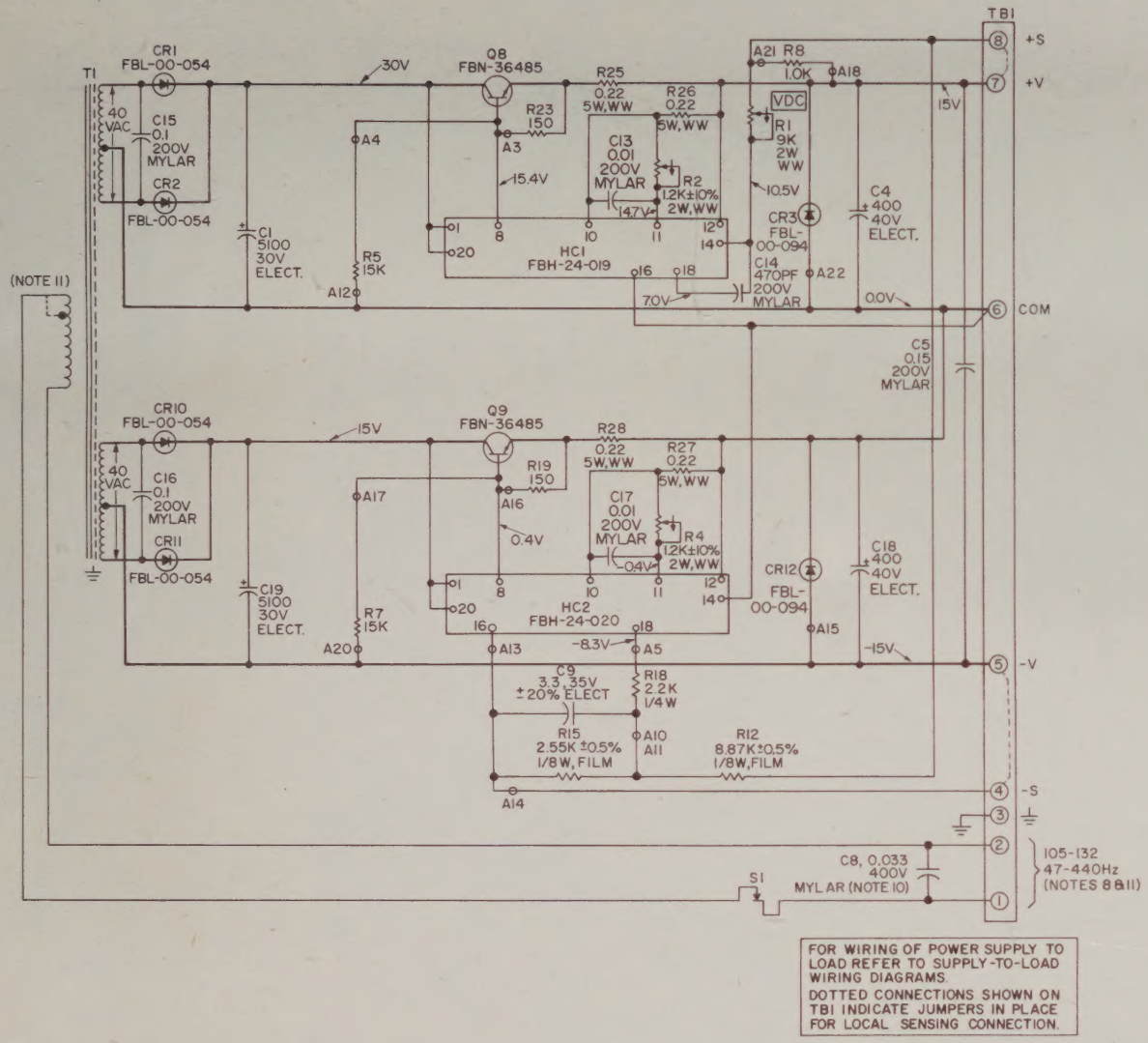


Figure 6. Test Connections For Performance Checks


REAR VIEW
CUSTOMER'S CUTOUT
(2) NO. 6-32 TAPPED HOLES FOR MOUNTING OF OVERVOLTAGE PROTECTION UNITS
INPUT-OUTPUT TERMINALS
NO. 8-32 TAPPED HOLES FOR CUSTOMER CHASSIS MOUNTING (4 ON EACH SURFACE)
SIDE VIEW
CUSTOMER'S CUTOUT (FAR SIDE)
(4) NO. 8-32 TAPPED HOLES (OPPOSITE SIDE) FOR CUSTOMER CHASSIS MOUNTING
MOUNTING SURFACE
TO MOUNT ON THIS SURFACE (OPPOSITE SIDE) PROVIDE 5/16 DIA CLEARANCE HOLES FOR (3)SCREW HEADS
FRONT VIEW
OVERVOLTAGE PROTECTOR (OPTIONAL ACCESSORY)
CUSTOMER'S CUTOUT
OUTPUT VOLTAGE ADJUST (FAR SIDE)
BOTTOM VIEW

NOTE

CUSTOMERS MOUNTING SCREWS MUST NOT PROTRUDE INTO POWER SUPPLY BY MORE THAN 3/8.



FOR WIRING OF POWER SUPPLY TO LOAD REFER TO SUPPLY-TO-LOAD WIRING DIAGRAMS.
DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS IN PLACE FOR LOCAL SENSING CONNECTION.

NOTES:

1. RESISTORS ARE COMP. 1/2W WITH VALUES IN OHMS, UNLESS OTHERWISE NOTED.
2. RESISTOR TOLERANCES: COMP. ±10%, FILM ±1%, WIREWOUND ±5%, UNLESS OTHERWISE NOTED.
3. CAPACITOR VALUES ARE IN MICROFARADS.
4. CAPACITOR TOLERANCES: MYLAR ±10%, ELECTROLYTIC -10 +100%.
5. DESIGNATIONS ARE LAMBDA PART NUMBERS.
6. SYMBOLS:
   - INDICATES CLOCKWISE ROTATION OF SHAFT.
   - INDICATES CONNECTION TO CHASSIS.
   - INDICATES TERM. ON PRINTED CIRCUIT BOARD.
   - INDICATES ACTUAL UNIT MARKING.
7. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115 VAC, 60Hz. RATED VOLTAGE NO LOAD. INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE D.C. UNLESS OTHERWISE NOTED, D.C. MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN COM.(TERM. 6) & INDICATED POINTS UNLESS OTHERWISE NOTED.
8. FOR 47-53 Hz INPUT, DELETE 40°C CURRENT RATING. FOR 63-440 Hz INPUT, CONSULT FACTORY
9. COAT MOUNTING SURFACE OF Q8, Q9, HC1 AND HC2 WITH DOW CORNING NO. 340 SILICONE GREASE.
10. C8 IS 0.01MF±10%, 1000V, PAPER ON UNITS WITH "V" OPTION.
11. ON UNITS WITH "V" OPTION, T1 HAS TAPPED PRIMARY. "V" OPTION UNITS CAN BE WIRED FOR 187-242 V INPUT (USING TAP) OR FOR 205-265 V INPUT (USING ENTIRE PRIMARY).

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIX A.

SCHEMATIC DIAGRAM

REGULATED POWER SUPPLY

MODEL
LXD-CC-152

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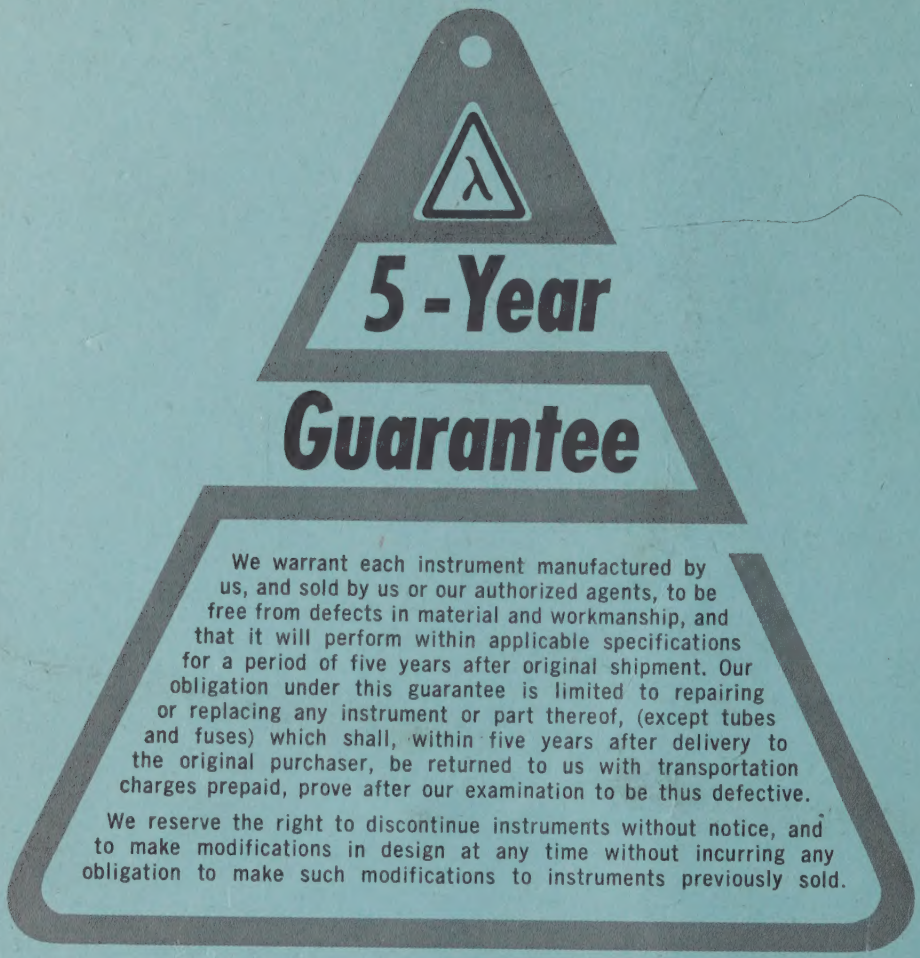
5-Year
Guarantee
We warrant each instrument manufactured by us, and sold by us or our authorized agents, to be free from defects in material and workmanship, and that it will perform within applicable specifications for a period of five years after original shipment. Our obligation under this guarantee is limited to repairing or replacing any instrument or part thereof, (except tubes and fuses) which shall, within five years after delivery to the original purchaser, be returned to us with transportation charges prepaid, prove after our examination to be thus defective.
We reserve the right to discontinue instruments without notice, and to make modifications in design at any time without incurring any obligation to make such modifications to instruments previously sold.

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